VETERINARY MEDICINE LIBRARY

OHIO STATE UNIVERSITY
APR 30 1958
LIBRARY

THE JOURNAL OF THE BRITISH VETERINARY ASSOCIATION

The Veterinary Record

PATRON: HER MAJESTY THE QUEEN

Vol. 70 No. 15 Issue No. 4175 307-328

April 12th 1958

Just Published

SMYTHE : VETERINARY OPHTHALMOLOGY

Second Edition

BY R. H. SMYTHE, M.R.C.V.S.

Formerly Examiner in Surgery to the Royal College of Veterinary Surgeons

The standard work. This edition contains much new material and additional illustrations. It continues to emphasize upon the differences between human and animal vision and provides detailed explanations of many physiological disparities which hitherto have not been completely apparent.

The book is divided into two sections ; the first section covers the anatomy and physiology of the domesticated animals and a great variety of other species. The second section deals with the medical and surgical aspects of animal ophthalmology.

Second Edition. 380 pages. 59 illustrations. **Price 42s.** **Postage 2s. 3d.**

WRIGHT : VETERINARY ANAESTHESIA

BY J. G. WRIGHT, D.SC., M.V.SC., F.R.C.V.S.

Professor of Veterinary Surgery in the University of Liverpool

A complete guide to anaesthetic agents, general and local, used in veterinary practice, this edition covers the latest advances in this field. The relative merits of various anaesthetic agents are discussed with detailed descriptions of the procedures employed and carefully chosen illustrations.

Fourth Edition. 320 pages. 91 illustrations. **Price 30s.** **Postage 1s. 9d.**

Bailliere, Tindall & Cox

7 & 8 HENRIETTA STREET, LONDON, W.C.2.

I S C

"CANINOVAC"

BRAND OF

Canine Distemper Vaccine

Egg adapted "Behring"

The ideal prophylactic for Canine Distemper and Hard Pad.

Easy to use—both freeze dried vaccine and solvent are packed in rubber capped vials.

Keeps for 12 months if refrigerated.

INTERNATIONAL SERUM CO. LTD.

The Paddocks, Frith Lane, Mill Hill, London, N.W.7

Telegrams : Interserum, Norphone, London Telephone : FINchley 5554

Available in Republic of Ireland from : Veterinary Supplies Co. Ltd., 26, Grafton Street, Dublin

The
VETERINARY RECORD

Founded by William Hunting, F.R.C.V.S., in 1888

7, MANSFIELD STREET, PORTLAND PLACE, LONDON, W.1. MUSEUM 6541

No. 15 APRIL 12th, 1958 Vol. 70

Registered for Transmission as a Newspaper *Price 2s. post free*

Studies in Bacteriological Meat Inspection. II.—A Field Study of Bacteriological Meat Inspection in North-west England

BY

J. M. OLIVANT

Department of Veterinary Pathology, University of Liverpool

SUMMARY.—1. *A field study of bacteriological meat inspection is described in which* 8 *of* 18 *abattoirs in a voluntary scheme lasting for* 1 *year submitted material from* 93 *"suspect" carcases for bacteriological and physico-chemical examination. The proportion of carcases sampled represented* 0.01 *per cent. of the annual kill in* 18 *abattoirs, and* 0.024 *per cent. of the annual kill in the* 8 *abattoirs which actively participated. Reasons for this poor response are discussed.*

2. *Independent abattoir and laboratory judgments on carcases failed to agree in* 24 *cases* (25 *per cent.*). *The results established that unacceptable, or potentially dangerous, carcases are being released for human food, and* 8 *bacteraemic carcases* (8 *per cent.*) *were detected which had been released by the meat inspectorate. Six of these could have been responsible for human illness.*

3. *A further* 16 *carcases* (17 *per cent.*) *were condemned by meat inspectors although no confirmation for this could be found by laboratory methods. The significance of this result is discussed.*

4. *Details are given of the techniques of bacteriological meat inspection. Attention is drawn to an "incubation test" for detecting abnormal odours in muscle which was found to be more effective than boiling or frying tests.*

Introduction

BACTERIOLOGICAL meat inspection has received the attention of public health authorities in Europe for many years. and there are several recent publications which describe its purpose and techniques (*e.g.* Jepsen, 1957; Olivant, 1957a, b, c; Schönberg, 1951; Standfuss, 1952; Thornton, 1957). In spite of a readily available literature, and the recommendations of an Interdepartmental Committee (1951), the procedure has failed to attract the attention of public health bacteriologists in this country, and only a few veterinarians have recorded their experiences of it (Norval, 1951-5; Thornton, 1953-6). Olivant (1957a) drew attention to the reason for this, and to the need for experimental studies in order to evaluate the significance of bacteriological meat inspection in the judgment of suspect carcases in Britain.

Evidence from other countries has shown that the chief advantage from using bacteriological methods in the abattoir may be to identify dangerous carcases which would otherwise have been released (Schönberg, 1951), or to permit the release of suspect, but non-infected carcases which would otherwise have been condemned (Albertsen, 1956; Lange, 1955). It has always been a matter for conjecture how far these advantages would apply in Britain. The objects in undertaking this work, therefore, were to study the present demand for laboratory aids for meat inspectors in this country, and the public health hazards or economic loss which result from irrational carcase judgment. A further object is to record experience of the techniques of bacteriological meat inspection and to suggest a standard of interpretation of the results they provide.

This paper describes an experimental study of bacteriological meat inspection which involved 18 of the larger public abattoirs in north-west England and which was made possible only by the active co-operation of the North-western Centre of the Association of Public Health Inspectors.

Organisation in the Abattoir

1. *Type of carcase to be sampled*

Samples were never required from the type of carcase for which Memo. 3 (Meat) recommends total condemnation, or from any other type of carcase in which the *post-mortem* findings clearly indicated condemnation. Bearing this principle in mind, samples were required from any emergency slaughter animal, any animal showing signs of illness during life, and from other types of carcase on which the proper judgment was a matter of doubt. A list of pathological conditions was issued to illustrate the types of carcase on which rational judgment is frequently difficult. This was based on the Danish regulations for meat inspection (Regulations, 1949; see Jepsen, 1957). Samples were taken from all classes of meat animal.

2. *Collection and despatch of specimens*

Samples were collected within 24 hours of slaughter. They comprised the following:—

(a) ½ to 1 lb. muscle covered by intact fascia and preferably taken from the extensor muscles of the forearm. In pigs and sheep, the whole forearm (covered with skin in pigs) was removed as close to the elbow joint as possible.

(b) Two intact intra-muscular lymph nodes.

(c) ½ to 1 lb. liver taken from the portal region together with a hepatic lymph node and emptied gall bladder.

(d) The whole spleen.

(e) One kidney.

(f) A piece of any other organ (plus its lymph node), the pathology of which made examination desirable.

Samples were removed with "clean" precautions and without unnecessary incisions. Where possible, lymph nodes were collected in the surrounding pad of fat. All samples were cooled before wrapping, wrapped individually in clean newspaper, and forwarded to the laboratory in corrugated paper and cardboard boxes. Airtight containers were never used.

3. *Record keeping*

Samples were sent to the laboratory with a full history and description of the *post-mortem* lesions in the carcase and offal. Standard forms were provided for this purpose. In addition, each abattoir kept a confidential and reasoned record of carcase judgment which only became available to the laboratory at the end of the experimental period. This arrangement caused no interference with the normal course of meat inspection.

Organisation in the Laboratory

1. *Bacteriological examination*

A. SAMPLES

Lymph nodes were dissected from surrounding fat, and skin and subcutaneous fat was removed from pigs' legs. A large surface area of each sample was then sterilised by flaming or searing. Small lymph nodes from pigs and sheep were sterilised on the surface by the technique of Lepovetsky *et al.* (1953). All techniques of sterilisation had been shown previously to be effective.

B. MEDIA

The following media were always used:—

5 per cent. sheep-blood agar for preparation of pour plates 0.5 per cent. glucose agar for shake cultures	Melted and held at 50° C. prior to inoculation.
Selenite broth	
MacConkey or D.C.A. plates	

At a late stage in the work, a few samples of muscle and lymph node were cultured in 10 per cent. salt broth (Maitland & Martyn, 1948), and when from pigs, also in sodium azide/crystal violet broth (Spears, 1954).

C. INOCULATION OF MEDIA

After aseptic removal of the surface layer, pieces of tissue weighing 1 to 2 g. were removed with a separate set of sterile instruments from the deeper parts of each sample. Each piece of tissue was cut through in several places to expose a large surface area, and transferred immediately to bottles of culture media.

Samples were cultured according to the following scheme:—

Muscle and two lymph nodes, each in	Blood agar (Pour plates) Glucose agar (Shake cultures) Selenite broth 10 per cent. salt broth (few samples only) C.V./NaN_3 broth (few pig samples only)
Spleen, liver, and kidney, each in	Blood agar (Pour plates) Glucose agar (Shake cultures) Selenite broth
Scrapings of gall-bladder mucosa and hepatic lymph node	Selenite broth MacConkey or D.C.A. plates (surface inoculation)

Studies on the pour-plate technique have been described previously (Olivant, 1957c). Control plates were always prepared to check the sterility of the blood agar.

D. INCUBATION AND SUBCULTURE

Cultures were incubated for 18 to 24 hours at 37° C. Subcultures were then made from all fluid

media, and from tissue remaining embedded in either the blood or glucose agar media whenever these failed to show evidence of bacterial growth. All cultures were incubated for a further 18 to 24 hours. Detailed identification of positive cultures was restricted to a few species of pathogenic or potentially pathogenic bacteria.

II. *Physico-chemical examination*

All muscle samples were examined for *p*H, abnormal odour, degree of bleeding, and evidence of oedema, by methods previously described (see Olivant, 1957b).

An "incubation test" for detecting abnormal odours in muscle was adopted late in the work, as boiling and frying tests often produced equivocal results. This consisted of incubating a large sample of fresh muscle for 18 hours at 37° C. and testing the deeper parts for abnormal odours.

III. *Record keeping*

Detailed records were kept of each sample. At the end of the experiment, abattoir record books were collected and meat inspectors' judgments on carcases were compared with the standard of carcase judgment adopted in the laboratory.

IV. *Laboratory judgment of carcases*

The standards adopted for carcase judgment were as follows:—

A. BACTERIOLOGICAL STANDARDS

1. *Total condemnation.* (a) Evidence of recent bacteraemia with pathogenic bacteria ("Specific infection").

(b) Colony counts of non-pathogenic bacteria exceeding "9 per sample" and a distribution of infection at this level suggestive of recent bacteraemia ("high-grade non-specific infection"). (See Olivant, 1957c.)

2. *Unconditional Release.* All other bacteriological findings; *e.g* small numbers of pathogenic bacteria restricted to liver or spleen; non-specific infection at lower levels than in (b) above ("low-grade non-specific infection").

B. PHYSICO-CHEMICAL STANDARDS

All carcases in category A(2) were re-assessed on the basis of the results of physico-chemical examinations of muscle. The following findings led to total condemnation:—

(a) Presence of abnormal odours.
(b) Evidence of generalised oedema.
(c) Evidence of inefficient bleeding.
(d) Muscle *p*H value higher than 6.6 as measured electrometrically or as indicated by a definite blue colour in the nitrazine-yellow test (Olivant, 1957b).

These standards will be discussed later in this paper.

Results

Table I shows the number of abattoirs taking part in this work, the number from which specimens were received, and the general distribution of specimens over a 12-month period. Less than half (44 per cent.) of the local authorities which agreed to take part in the scheme submitted samples to the laboratory, and the population of slaughter animals available for study was reduced to a correspondingly low level (42 per cent.). Approximately 10 per cent. of samples had to be discarded on receipt or excluded from the results because of faulty sampling or record keeping. Thus only 93 samples were suitable for the purposes of this experiment, and these originated from 8 abattoirs slaughtering a total of 386,000 animals yearly. Taking the results as a whole, therefore, 0.024 per cent. of carcases examined in 8 abattoirs presented the meat inspector with difficulties which could be resolved only by means of laboratory aid. No satisfactory explanation has been found for this poor response to the scheme, and it proved impossible to correlate either the size of the annual kill or casualty rate in different abattoirs with the extent to which they participated in the scheme. Indeed 6 abattoirs kept no record of casualty slaughter at all.

TABLE I
NUMBER OF ABATTOIRS AND DISTRIBUTION OF SPECIMENS

	Total	Obtained by A.P.H.I.	Obtained by department
Number of abattoirs	18	13	5
Annual kill ...	910×10^3	503×10^3	407×10^3
Number of abattoirs submitting samples	8	7	1
Annual kill ...	386×10^3	286×10^3	100×10^3
Number of samples	103	97	6
Number of usable samples	93	87	6

Table II shows the distribution of samples according to circumstances of slaughter, and the severity and general nature of the disease affecting the carcase. Diseases or abnormalities diagnosed by meat inspectors were so varied that there is little purpose in detailing them here. Most of the common types of illness and accident which affect meat animals were represented. Nevertheless, in view of the wide discretion given to meat inspectors for selecting material, it is interesting to find that twice as many samples

TABLE II
DISTRIBUTION OF SAMPLES ACCORDING TO SPECIES AND NATURE OF DISEASE

Species	Number of samples	Nature of disease affecting carcase		
		Acute disease	Chronic disease	Accident
Adult cattle	33 (14)	8 (8)	23 (4)	2 (2)
Calves ...	6 (5)	3 (2)	0	3 (3)
Sheep ...	14 (1)	2	11	1 (1)
Pigs ...	40 (20)	19 (11)	18 (6)	3 (3)
Total ...	93 (40)	32 (21)	52 (10)	9 (9)

Figures in brackets refer to numbers of casualties.

TABLE III
COMPARISON OF ABATTOIR AND LABORATORY JUDGMENTS ON CARCASES

Species	Abattoir judgment		Laboratory judgment				
			Condemnation				Release
	Condemnation	Release	Total number	Specific infection	H.G.N.S. infection	Physico-chemical	
Cattle ...	14	19	13	6	6	1	20
Calves ...	4	2	5	2	1	2	1
Sheep ...	3	11	2	2	0	0	12
Pigs ...	26	14	15	9	5	1	25
Total ...	47	46	35	19	12	4	58

(61) were taken from carcases affected with chronic disease and traumatic lesions, as from carcases showing lesions of acute disease only (32), and that less than half of the samples (40) were obtained from animals slaughtered under casualty procedure. These results suggest that any future legislation on bacteriological meat inspection should allow meat inspectors complete discretion on the types of carcase to be sampled.

The results of independent abattoir and laboratory judgments on carcase are recorded in Table III, which shows that bacteriological findings were responsible for much the greater proportion of laboratory condemnations, and only in 4 cases was it found necessary for the laboratory to condemn a carcase for " physico-chemical " reasons alone. Three of the 4 carcases in this group were condemned because muscle *p*H values were in the range 6.8 to 7.0. One other pig carcase was condemned because of a uraemic odour in the muscle.

Bacteriological results are analysed further in Table IV which shows the types of bacteria responsible for specific infections. There is little doubt

TABLE IV
LABORATORY JUDGMENTS ON CARCASES
(SPECIFIC INFECTION)

Species	Number condemned	Bacteriological results
Cattle	6	*C. pyogenes* (1) ; Group D Strept. (2) ; Group C Strept. (2) ; coagulase positive Staph. (1)
Calves	2	*C. pyogenes* (1) ; Haem. coli (1)
Sheep	2	*C. pyogenes* (1) ; Group D Strept. (1).
Pigs	9	*C. pyogenes* (3) ; Group C Strept. (2) ; Erysipelothrix (3) ; mixed Haem. Strept. and coagulase positive Staph. (1)

TABLE V
COMPARISON OF ABATTOIR AND LABORATORY JUDGMENTS ON CARCASES

Number of carcases sampled	Number on which abattoir and laboratory judgments agree		Number released by M.I. but condemned by laboratory	Number released by laboratory but condemned by M.I.
	Condemnation	Release		
93	27	42	8	16

that 8 of the 19 carcases included in Table IV formed a potential hazard to human health (3 group D streptococcal infections, 2 infections with coagulase positive staphylococci, and 3 *E. rhusiopathiae* infections), and all 19 carcases provided unequivocal evidence of bacteraemia. In the majority of cases, the level of infection in muscle and carcase lymph node was very low, and only detected after tissue subculture, or by the use of selective media. None of the specific infections was associated with Salmonella or heat-resistant *Cl. welchii*.

High-grade non-specific infections were represented by a variety of bacteria, all of which may have originated from the intestine, *e.g.* Coliforms, non-haemolytic Streptococci, anthracoids, Clostridia, or Proteus. Twelve carcases were classified in this group because primary plates revealed heavy infection and the distribution of the infection suggested recent bacteraemia (see Olivant, 1957c). Although no keeping-quality tests were carried out there can be little doubt of the significance of the findings in that respect.

Table V compares the independent abattoir and laboratory judgments on carcases and shows that there were 24 carcases (25 per cent). on which the two judgments failed to agree. Eight of these (8 per cent.) were bacteraemic carcases which had been released by meat inspectors as suitable for human food. A further 16 carcases (17 per cent.) were found to have been condemned by meat inspectors although no laboratory evidence could be found in support of this. The details of all carcases on which there was a conflict of judgment are provided in Tables VI and VII.

Discussion

The objects of this study have not all been achieved and perhaps the outstanding failure was the disappointingly poor response to the scheme as a whole. The results suggest that whilst there seems to be a general awareness among meat inspectors of the value of laboratory aids to carcase judgment, several factors prevent their being used to full advantage. None of these factors proved measurable. There was no clear evidence, for example, that the size of the annual kill, or casualty rate, were of significance in this respect. It was striking that 74 of the 93 samples sent to the laboratory originated from 3 centres whose meat inspection staff was outstandingly com-

TABLE VI

RESULTS OF LABORATORY EXAMINATION ON EIGHT CARCASES RELEASED FOR HUMAN FOOD

Number	Species	History	Casualty ?	Bacteriological results	Physico-chemical examination	Laboratory judgment
1	Cow	Subacute Staph. mastitis. Carcase set well and "quartered brightly"	No	Heavy growth coagulase positive. Staphs. on primary plates from lymph nodes, spleen and liver, and from muscle on subculture	*p*H = 5·8, other tests normal	Specific infection
2	Cow	Acute mastitis. No other history	No	Heavy growth Group C Strept. on primary plates from muscle, lymph nodes, liver and kidney	*p*H = 6·0, other tests normal	Specific infection
3	Cow	Newly-calved cow, subacute metritis. Slightly fevered carcase ?	Yes	Group C Strept. on subculture from muscle, lymph nodes, and on primary plates of spleen and liver	*p*H = 6·0, slight odour of "newly-calved cow"	Specific infection
4	Cow	Chronic suppurative pneumonia, chronic interstitial nephritis	Yes	Group D Strept. and Coliforms on primary plates of muscle, lymph nodes and spleen	*p*H = 6·4, slight oedema	Specific and high-grade non-specific infection
5	Bullock	Intestinal obstruction	Yes	Heavy infection Group D Strept. Micrococci and Coliforms on primary plates all tissues. Clostridia in muscle	*p*H = 6·4, other tests normal	Specific and high-grade non-specific infection
6	Pig	Acute pleurisy	No	Heavy growth micrococci, coli and paracolon in primary plates spleen, liver and kidney. Coagulase positive. Staphs. and Haem. Strept. in subcultures of lymph nodes, spleen and liver	—	Specific and high-grade non-specific infection
7	Pig	Unilateral pyelonephritis	No	Heavy infection Haem. coli primary plates muscle and lymph node. Paracolon and Clostridia in one lymph node and spleen on subculture	*p*H = 5·8, other tests normal	Specific and high-grade non-specific infection
8	Pig	"Lesions of chronic swine erysipelas"	No	*E. rhusiopathiae* on subculture from muscle, lymph node and spleen	*p*H = 6·2, other tests normal	Specific infection

petent and enthusiastic, and it seems likely that the poor response from other centres resulted chiefly from shortage of staff, the novelty of the scheme itself, and perhaps bad administration from the laboratory. A wider survey with official support from public health or veterinary investigation laboratories may well lead to a proportionately better response than that obtained here. Clearly, however, the volume of work which would result from the development of bacteriological meat inspection throughout the country in the immediate future is unlikely to embarass any existing laboratories, and there is no urgent need to develop special facilities for this purpose.

One of the chief difficulties in a study of this nature is a lack of certainty on the most suitable laboratory techniques to adopt, and there is a need for further experimental investigations. Although comparative work has shown that the plating and subculture technique used here to demonstrate non-specific infection is one of the most effective (Olivant, 1957c), the low level of specific infection generally found in muscle and carcase lymph node suggests that extensive use should be made of selective and enrichment media. Further work is required to determine the most appropriate media to use. It is desirable, too, to standardise the laboratory tests used to demonstrate inefficiency of bleeding and muscle oedema, as it became clear from control studies that these tests have no value in their present form. The muscle *p*H test and the incubation test for detecting abnormal odours are easily standardised, however, and the latter especially may materially assist a meat inspector in his judgment of a carcase. There is an obvious link between these technical considerations and standards of interpretation of laboratory results.

Standards of interpretation of bacteriological results vary between countries and are a matter for active discussion wherever bacteriological meat inspection is practised. Most countries in Northern Europe agree that the presence of a food poisoning organism, or other specific pathogen in any *one* organ or tissue should lead to total condemnation or heat treatment of the carcase. This procedure is adopted, for example, in Sweden (Kämpe, 1956), Denmark (Jepsen, 1957), and Germany (Meat Law, 1940). French workers, on the other hand (Névot & Pantaléon, 1956), attach a similar significance only to the presence of these bacteria in muscle, carcase lymph node, or bone marrow. In this work total condemnation due to specific infection has been adopted only when cultures provided evidence of recent bacteraemia. Clearly, evidence of this nature could be obtained from cultures of either muscle, or two carcase lymph nodes, or spleen, liver, and kidney. A carcase was never condemned because one R.E. organ alone was infected with a specific pathogen. This seemed a reasonable standard to adopt in view of our present state of knowledge of the distribution and fate of pathogenic organisms

TABLE VII

RESULTS OF LABORATORY EXAMINATIONS ON 16 CARCASES CONDEMNED BY MEAT INSPECTORS

Number	Species	History	Casualty ?	*Post-mortem* lesions	Abattoir judgment (all condemned)	Laboratory judgment (all released)
1	Pig	Nil. Good condition	No	Chronic peritonitis and pyaemic lesions liver, intestines and pelvis	Pyaemia	L.G.N.S. *p*H = 6·5
2	Pig	Nill. Losing weight	No	Nil. Very lean	Emaciation and oedema	L.G.N.S. *p*H = 6·5
3	Pig	"Anorexia"	Yes	Pyaemic foci sternum, spine and one hock	Pyaemia	L.G.N.S. *p*H = 6·2
4	Pig	18 - weeks - old "Runt"	No	Chronic enteritis	Oedema	L.G.N.S. *p*H = 6·2
5	Cow	Lacerated injury hind leg	Yes	Local bruising, some cellulitis. Fatty liver	Abnormal odour at re-inspection	L.G.N.S. *p*H = 6·5
6	Bullock	Nil	No	Kidney neoplasia and cystitis	Uraemia	L.G.N.S. *p*H = 6·1
7	Pig	Anorexia following CV vaccination	Yes	Pleurisy and pneumonia	?	L.G.N.S. *p*H = 5·7
8	Pig	Chronic lameness	Yes	Septic foot and abscess in pelvic musculature	Pyaemia	L.G.N.S. *p*H = 5·8
9	Sheep	Nil	No	Chronic pyaemic lesions liver, lungs and one hock	Pyaemia	L.G.N.S. *p*H = 5·7
10	Sow	"Anorexia" but in good condition	Yes	Pyometra	Septicaemia ?	L.G.N.S. *p*H = 6·5
11	Pig	Nil. Good condition	Yes	Leukaemic lesions liver and thorax	Leukaemia	L.G.N.S. *p*H = 5·8
12	Pig	Bilateral arthritis of carpus. Losing flesh	No	Chronic arthritis carpal joints, and chronic pleurisy	Arthritis	L.G.N.S. *p*H = 6·0
13	Pig	Ulcerating lesions legs and subcutaneous abscesses	Yes	Few chronic subcutaneous abscesses	Septicaemia ?	L.G.N.S. *p*H = 6·4
14	Sow	"Anorexia" but in good condition	Yes	Unilateral pyelonephritis	Septicaemia ?	L.G.N.S. *p*H = 6·5
15	Sow	Severe foot infection, losing weight	Yes	Chronic metastatic abscesses in liver and lung	Pyaemia	L.G.N.S. *p*H = 6·0
16	Pig	Recent injury	Yes	Pneumonia, few pyaemic lesions in liver and thorax	Pyaemia	L.G.N.S. *p*H = 6·2

during the course of an infective disease. Further, since evidence of bacteraemia may be obtained in the absence of the liver and spleen, the adoption of this "Liverpool" standard has one important practical advantage, namely: that a meat inspector need not be deterred from sampling a carcase because these organs become "lost" in the abattoir. Muscle, carcase lymph node, and kidney are always available, however, and together may provide acceptable evidence of bacteraemia. Naturally, the more samples examined the clearer the evidence will be.

This standard of judgment for specific infections led to 19 carcases (20 per cent.) being recorded as condemned by the laboratory. Eight of these carcases were released for sale (see Table VI). There can be no doubt that any carcase affected with a generalised specific infection is unfit for human food, regardless of the significance of the pathogen for human health. In 4 of these carcases, however (2 Staphylococcal infections; 2 group D Streptococcal infections), the infection could have resulted in an outbreak of food poisoning, and the significance of the remaining Group C Streptococcal infections (2) and mixed Coliform and paracolon infection (1) cannot be disregarded in the light of our present knowledge of the aetiology of food poisoning. Erysipelothrix infections (1) too, form an unnecessary risk for food handlers. Clearly then, some unacceptable, or potentially dangerous, carcases are being released for human consumption and there seems a strong case for a wider investigation of the hazards they present.

The standard of judgment for carcases infected with non-pathogenic bacteria has been discussed in an earlier paper (Olivant, 1957c). As in the case of specific infection, it seemed reasonable to insist that the laboratory should obtain evidence of recent bacteraemic spread and of a higher level of infection than found in "normal" animals, before judging a carcase as unfit for human food. It was thus possible to distinguish "high-grade non-specific infection" and "low-grade non-specific infection." Nine of the 12 carcases placed in the former grade originated from injured or moribund animals, with *p*H values exceeding 6.6. All were condemned by meat inspectors as a result of careful re-examination 24 hours after slaughter and there is no doubt that the meat inspectors' judgments were fully justified bacteriologically. Tissues infected with Clostridia or Proteus, especially, may rapidly decompose.

The laboratory judgment of the 62 carcases found to be affected with only low-grade non-specific infection was always considered in relation to the results of the physico-chemical tests. In 58 of these carcases, no evidence was obtained of any abnormality and they were recorded by the laboratory as fit for human consumption. Sixteen of these carcases, however, were subsequently found to have been condemned by meat inspectors (see Table VII), but there are several reasons why these cannot be regarded as "unnecessary" condemnations. In 4 cases for example (Nos. 2, 4, 5, 6) it is known that the physico-chemical tests failed to reveal abnormalities which were quite obvious to the meat inspector when he re-examined the carcases 24 hours after slaughter, and it was because of carcases 5 and 6 that the incubation test was adopted by the laboratory in preference to the usual boiling and frying tests. There may have been other justifiable grounds for condemnation amongst the remainder. Local trade requirements may have precluded salvage. Nevertheless, in view of the chronicity of lesions in many cases and the reasons for condemnation as recorded in the abattoir, it is at least possible that some attempt at salvage could have been made. On consideration of this evidence there seems no other course to adopt than to accept that the final judgment of a carcase affected with a low-grade non-specific infection only must always remain the responsibility of the meat inspector—a view which is emphasised by Danish veterinarians. This field study, therefore, failed to show whether a wastage of sound meat had occurred as a result of faulty carcase judgment, and the solution to this problem will only be found when both laboratory and abattoir judgments can be carried out by the same individual. Thornton (1953-6) has shown that a considerable saving of meat may result from the proper use of bacteriological aids.

Each of the remaining 4 carcases which were condemned by the laboratory for physico-chemical reasons alone were also condemned by meat inspectors on the basis of their re-examination 24 hours after slaughter. One was a uraemic pig carcase in which the uraemic odour was only detected in this laboratory by use of the incubation test, and 3 were from cattle with abnormally high muscle *p*H (6.8 to 7.0). Two of these cattle samples were from calves, 1 affected with extensive pyaemic lesions, and 1 with paraplegia. The third sample was from a cow affected with bilateral pyelonephritis. Routine estimation of muscle *p*H thus rarely provided information of value in carcase judgment.

The results of this work suggest a need for wider studies of bacteriological meat inspection, especially in relation to the contribution it may make to reducing the incidence of meat-borne illness in man and improving the hygienic quality of meat. There seems no reason why future investigations could not be conducted along similar lines to this present study—there would be no interference with the normal course of meat inspection and there is no reason to suppose that support would not be forthcoming from the Association of Public Health Inspectors. The laboratory techniques and standards of interpretation of laboratory results adopted here form a base line for future work. -Moreover, the scope of an investigation of this nature falls within the interests of both the Public Health Laboratory Service and the Veterinary Investigation Centres. Special facilities are not required at this stage. Added support might be obtained from the few abattoirs under veterinary supervision which maintain their own laboratory service.

Should laboratories undertake this work primarily from a diagnostic point of view, however, and with the aim of helping meat inspectors to reach a rational decision in carcase judgment, it is felt that the standards adopted in this work could be used with confidence for at least an interim period. Laboratory reports should require condemnation of a carcase only when they present evidence of recent bacteraemia due to a specific pathogen, or of a high-grade non-specific infection. The judgment of all other types of carcase *must* remain a matter for the discretion of the meat inspector.

Acknowledgments.—I should like to thank the North-western Centre of the Association of Public Health Inspectors for the co-operation which made this work possible. Special thanks are due to their secretary, Mr. S. Brumat, who undertook many of the administrative responsibilities.

I also express my thanks to Professor D. L. Hughes for his interest in the work and to Miss Claire O'Rourke for her capable technical assistance.

References

ALBERTSEN, V. E. (1956). *Proc. First Symposium International Association Veterinary Food Hygienists.* 101-3.

GERMAN MEAT LAW (1940). *Fleischbeschaugesetz von Oktober* 1940. *Ausführungsbestimmungen A.*

INTERDEPARTMENTAL COMMITTEE (1951). Report of Interdepartmental Committee on Meat Inspection. H.M.S.O., London.

JEPSEN, A. (1957). "*Meat Hygiene.*" W.H.O. Monograph Series No. 33. W.H.O. Geneva. 235-50.

KAMPE, A. (1956). *Proc. First Symposium International Association Veterinary Food Hygienists.* 83-5.

LANGE, M. (1955). *Medlemsbl. danske Dyrlaegeforen.* **22.** 1.

LEPOVETSKY, B. C., WEISER, H. H., & DEATHERAGE, F. E. (1953). *Applied Microbiol.* **1.** 57.

MAITLAND, H. B., & MARTYN, G. (1948). *J. Path. Bact.* **60.** 553.

NEVOT, A., & PANTALEON, J. (1956). *Proc. First Symposium International Association Veterinary Food Hygienists.* 65-72.

NORVAL, J. (1951-5). City and Royal Burgh of Edinburgh. Reports of the Public Health Department (Veterinary Services Section).

OLIVANT, J. M. (1957a). *Vet. Rec.* **69.** 366.

———. (1957b). "An Introduction to Laboratory Methods in Veterinary Food Control." R.C.V.S. Library, London.

———. (1957c). *Vet. Rec.* **69.** 1,003.

REGULATIONS. (1949). Instructions concerning Meat Inspection, Denmark. December 30th, 1949. (Translation.)

SCHONBERG, F. (1951). "*Die Ausführung de tierärztlichen Fleischuntersuchung.*" 4th ed. Paul Parey, Berlin.

SPEARS, H. N. (1954). *J. comp. Path.* **64.** 152.

STANDFUSS, R. (1952). "Bakteriologische Fleischbeschau." 4th ed. Richard Schoetz, Berlin.

THORNTON, H. (1953-6). City and County of Newcastle upon Tyne. Annual Reports of the Veterinary Officer, 1953-6.

———. (1957). "Textbook of Meat Inspection." 3rd ed. Baillière, Tindall & Cox, London. 444-8.

Refresher Article No. 7

Advances in Anaesthesia in the Last Ten Years

BY

L. W. HALL

Department of Veterinary Clinical Studies, University of Cambridge

SUMMARY.—This article was written at the request of the Editorial Committee of THE VETERINARY RECORD. *It takes the form of a brief review of the advances made in the field of anaesthesia in the last 10 years and indicates the lines of thought which lie behind these advances. The methods of use of the drugs employed to produce the three effects of anaesthesia, namely narcosis, analgesia, and relaxation are discussed, and advances in the field of premedication are also considered. Brief mention is made of controlled hypotension, hypothermia, the use of antidotes in anaesthesia, shock, and replacement therapy.*

IN the last decade there has been a growing realisation that all the aims of anaesthesia cannot always be achieved by the use of only one anaesthetic drug. This has resulted in the increasing use of what have come to be known as "balanced" methods of anaesthesia. The term "balanced anaesthesia" was coined by Lundy in the year 1926 but the methods have undoubtedly grown up on the foundations laid by Crile in 1913 when advancing his theory of "shockless operations" or "anoci-association." Crile (1913) believed that shock was due to the arrival at the brain stem of nerve impulses from the traumatised region of the body, since by the combined use of local or spinal analgesia and general anaesthesia he was able to prevent the onset of shock. Lundy used the term "balanced anaesthesia" to describe a similar system of anaesthesia based on premedication, light narcosis, and local analgesia. To-day, balanced anaesthesia does not necessarily include the use of local or spinal analgesia, and the combinations of agents used are, in many instances, more complicated than those originally suggested by Lundy. Doubtless advancing knowledge will allow still further modification of techniques, but it appears that the underlying principles of balanced anaesthesia will still have to be observed for many years to come.

The present-day approach to the subject is based on the recognition of the fact that anaesthesia involves three effects, namely narcosis, analgesia, and relaxation of the skeletal muscles (Gray & Rees, 1952). In the past it was usual to produce all three effects, quite indiscriminately, by the use of one drug, *e.g.* chloral hydrate or pentobarbitone sodium alone. It was impossible to produce a greater degree of muscle relaxation in the patient without, at the same time, producing a deeper level of narcosis—often with consequent severe depression of the central nervous and cardiovascular systems. To-day, however, the anaesthetist can, by the selection of the appropriate drugs, produce narcosis, relaxation, and analgesia almost independently of each other. Profound muscle relaxation can now be produced without subjecting the patient to deep narcosis. Indeed, provided that the analgesic element is supplied in some appropriate manner the patient need be only lightly narcotised and thus, after the operation, is comparatively free from post-anaesthetic nausea and "hang-over."

In order to emphasise how one effect may be produced independently of the others it is intended to review the advances made in veterinary anaesthesia under the headings of narcosis, analgesia, and relaxation. In addition, advances in the field of premedication, and such subjects as the control of surgical haemorrhage, hypothermia, and the treatment of shock will also be considered.

Narcosis

Under the heading of narcosis may be considered the use of such drugs as the barbiturates, β-naphthoxyethanol chloral hydrate, the steroid compounds, and the inhalational anaesthetic agents.

1. *The Barbiturates*

Until very recently pentobarbitone sodium was more widely used as a general anaesthetic in the dog and cat than any other agent. It was given in doses sufficient to produce unconsciousness, some degree of muscle relaxation, and an absence of response to noxious stimuli, but during the last few years there have been indications of a tendency to modify the method of use of this drug. Only minimal doses of pentobarbitone sodium are given and satisfactory operating conditions are obtained by the use of some form of local analgesia.

Thiopentone sodium is probably more widely used in veterinary anaesthesia than is any other agent. It is used in all kinds of animals and for all types of operations. In the horse, thiopentone is employed either alone to provide full anaesthesia for operations of short duration (Boswell, 1949; Longley, 1950; Waddington, 1950), or to induce anaesthesia which is then maintained by other agents, *e.g.* chloroform or cyclopropane. It may be given in a dose of 1 g. per 200 lb. bodyweight by extremely rapid intravenous injection (the injection being completed in 5 to 8 seconds) while the horse is standing. The animal "goes down" quietly and in a relaxed state. The technique appears to be relatively safe, and the veterinarian can work with the minimum of lay assistance. The main disadvantage in its use is the occurrence of violent struggling associated with unsuccessful attempts to stand up during the recovery period. This disadvantage can be overcome by either applying restraint at the end of the anaesthetic period and not allowing the animal to attempt to stand before full consciousness is regained (Ford, 1951) or

by the use of chlorpromazine (approximately 0.1 mg. per lb. bodyweight, intravenously) at the end of the anaesthetic period.

In adult cattle thiopentone is used in a similar manner (Henderson, 1944; Ford, 1951). Cattle recover quietly from thiopentone sodium anaesthesia. Thiopentone sodium is also a valuable intravenous agent for use in sheep (Titchen, Steel, and Hamilton, 1949) and pigs (Muhrer, 1950; Clover, 1955).

However, the drug is most widely used in the dog and cat, in which animals it permits the easy performance of minor surgery or diagnostic investigations, but is of only limited value for major surgical interferences. It cannot produce adequate muscle relaxation without, at the same time, causing severe respiratory depression. When used to maintain anaesthesia for long periods the post-anaesthetic recovery time is very prolonged.

Until 1949, it was believed that the duration of the narcosis produced by an intravenous injection of thiopentone was determined by the rate of its breakdown in the body, but it is now known that this is not the case It has been demonstrated in man, and in the dog, that thiopentone is only slowly detoxicated in the body and its short duration of action after small doses is due to rapid diffusion to the fat depots and other non-nervous tissues (Mark, Papper, Brodie & Rovenstine, 1949; Mark, Lief, Papper, Rovenstine, Bernstein & Brodie, 1949; Mark, Bernstein & Brodie, 1950; Brodie, Mark, Papper, Leif, Bernstein & Rovenstine, 1950; Brodie, Burn, Lief, Papper, 1952; Brodie, Bernstein & Mark, 1952, 1952a; Brodie, 1952; Lief, Burns, Papper & Brodie, 1952; Dundee, 1955). Only after the administration of large doses which saturate these tissues as well as the brain does the time taken for recovery of consciousness depend on the actual elimination of the drug from the body.

Many barbiturates have been prepared and tested in an attempt to find a better agent than thiopentone. Although the use of several of these compounds has been reported in the veterinary literature (Titchen *et al.*, 1949; Marcenac, Bordet & Leconstumier, 1952; Seneviratne & Pillai, 1953; Lumb & Armistead, 1952; Dunne & Benbrook, 1954; Crawshaw, 1955; Tolle, 1955), it is, at the moment, impossible to say whether any of them will find a place in anaesthesia.

2. *Chloral Hydrate*

Chloral hydrate was one of the first narcotic agents to be used in veterinary surgery, and despite the advances which have been made in the development of new narcotic drugs, its use is still widespread. Many veterinarians consider that even to-day it is the best available narcotic for use in the horse. However, because of its toxic nature and of the long time necessary for recovery after full anaesthetic doses have been used, it is now usual to administer the drug to produce only light narcosis. Response to painful stimuli is abolished by the use of local or regional analgesia, and thus chloral hydrate is used in a balanced anaesthetic technique.

3. *β-Naphthoxyethanol*

This agent was introduced in 1949 as an anaesthetic agent for use in horses, and it was said to be unsuitable for use in other kinds of animal (Francis & Parry, 1949). It soon became apparent that even in horses it is unreliable and indeed, perhaps, dangerous. Its use in conjunction with a thiobarbiturate, thialbarbitone, in horses and in cattle was no more successful, and it is unlikely that β-naphthoxyethanol will ever have a place in modern balanced anaesthesia. Details of the properties and actions of β-naphthoxyethanol have been published in the veterinary press (Parry, 1950, 1950a, 1950b, 1951, 1951a; Harrow, 1950; Bolton, 1951; Kirkwood, 1952; Watson, 1953).

4. *Steroid Compounds*

The demonstration by Selye in 1941 that certain steroids produced anaesthesia in fish and in rats opened up an interesting field of study.

One compound, 21-hydroxypregnanedione, has been shown to be an effective anaesthetic agent, with no hormonal activity, in rats, cats, dogs, monkeys, and man (Laubach, Clan & Rudel, 1955). It is claimed that this compound is a more complete and efficient anaesthetic than is thiopentone. Unfortunately, unless given slowly and in a very dilute solution it gives rise to a severe thrombo-phlebitis. This property limits its use in veterinary anaesthesia.

5. *The Inhalational Anaesthetic Agents*

Since it is possible to induce anaesthesia easily and quickly by the intravenous injection of a drug such as thiopentone, the tendency to-day is to use the inhalational agents only for the maintenance of the anaesthetic state.

Advances in the use of inhalational anaesthetic drugs have been mainly confined to improvements in the methods of their administration. The use of some type of apparatus which provides for "closed" or "semi-closed" methods is becoming more widespread and endotracheal intubation is now commonplace in all kinds of animal (Gadd, 1948; Ezzel, 1947; Vonte & Hannema, 1949; Pérez y Pérez, 1952; Jones, Scales & Wadsworth, 1952; Dyce, Jones & Wadsworth, 1952; Palmer, Hayes & Dorsey, 1954; Messervy & Wynn-Jones, 1956).

One new agent, halothane, has been introduced and is now being subjected to clinical trials (Hall, 1957).

Premedication

Premedication is a procedure which is at present being re-introduced into veterinary anaesthesia. Before the advent of the intravenous anaesthetic agents it was customary to administer a strong sedative to an animal before inducing anaesthesia or injecting local analgesic solutions. With the increasing use of intravenous anaesthetic agents this pre-anaesthetic sedation fell into disuse. To-day, premedication is once again being used, but strong sedatives are now avoided, and the aim is to produce mild sedation and a lowered metabolic rate without reducing the minute volume of respiration. Such premedication has been found to be of great assist-

XUM

ance to the anaesthetist because it smooths out the course of the subsequent anaesthetic. A belladonna derivative is given at the same time as the sedative agent in order to reduce the flow of saliva and bronchial secretions.

Morphine, papaveretum, and pethidine are all still used for premedication but recent years have seen the introduction of the phenothiazine derivatives, promethazine hydrochloride and chlorpromazine hydrochloride for pre-anaesthetic sedation. Animals premedicated with one or the other of these phenothiazine derivatives are calm and easily anaesthetised with the minimum of excitement. In horses chlorpromazine premedication (0.25 to 1.0 mg. per kg., intramuscularly 1½ hours before induction of anaesthesia), practically eliminates the narcotic excitement and struggling seen after thiopentone sodium anaesthesia. In pigs, premedication with chlorpromazine greatly decreases the intensity and violence of the squealing evoked by handling and restraint.

It should be noted that doses of chlorpromazine used for premedication do not necessarily produce obvious signs of sedation, and that larger doses which do produce obvious sedation may cause the anaesthetic recovery period to be very prolonged. Also the action of chlorpromazine appears to be rather uncertain, particularly in horses. For further details of the actions of chlorpromazine in domestic animals reference may be made to articles which have appeared in the veterinary literature (Schweizer, 1954; Troughton, Gould & Anderson, 1955; Weaver, 1956; Martin & Beck, 1956; Owen & Neal, 1957; Ritchie, 1957; Martin, Simpson & Reid, 1958).

Relaxation

The introduction of relaxant, or neuro-muscular blocking, drugs into veterinary practice has entailed the risk of operations being performed on paralysed but fully conscious animals. It is, therefore, incumbent upon the veterinary anaesthetist to ensure that such a situation must never arise. It cannot be too strongly emphasised that for humane reasons relaxant drugs must not be administered to animals undergoing surgery unless the animal is already unconscious and can be maintained in the unconscious state for the whole duration of their action. While under the influence of neuro-muscular blocking drugs an animal is capable of exhibiting a number of signs which may be taken to indicate that the covering anaesthesia is inadequate. Such signs include an increase in the pulse rate, paleness of the mucous membranes and sweating. In addition to these signs it should be noted that normal clinical doses of the relaxant drugs do not prevent an animal from moving in response to painful stimuli (Hall & Weaver, 1954).

The use of a relaxant drug is most definitely unwise unless facilities which will enable immediate and sustained artificial respiration to be carried out are available, and the general absence of such facilities in veterinary practice may be the principal reason why these drugs are not in more common use in veterinary surgery.

The relaxant drugs which have been introduced into anaesthesia produce neuro-muscular block by two different processes: (a) by competition with acetylcholine at the motor end plate; and (b) by inducing long-lasting depolarisation of the motor end plates. Accordingly they are classified as being either "competition blocking agents" or "depolarising agents," and although it has recently been shown that there is a third type of neuro-muscular block which appears to combine the two processes, this classification has not been changed.

1. *The Competition Blocking Agents*

Since this group of compounds includes the alkaloid curare, they are often referred to as the "curarising agents." Gallamine triethiodide and laudexium sulphate are also among this group of compounds and all these substances have been used in veterinary anaesthesia in recent years. Their action is antagonised by neostigmine, and if its muscarinic activity is abolished by the administration of atropine, this compound may be used to restore full muscular activity at the end of the operation.

2. *The Depolarising Agents*

This group of the relaxant drugs includes the halide salts of suxethonium and suxmethonium, and decamethonium (C10). Decamethonium is now only rarely used in anaesthesia, but the suxethonium and suxmethonium compounds are in common use. Their action appears to be certain and reliable in cats, dogs, horses, and pigs.

In man, a single injection of suxethonium or of suxmethonium usually produces only a brief period of paralysis and these drugs are therefore known as "short-acting" relaxants, but the duration of the response obtained in animals depends on the kind of animal concerned. It has been suggested that these variations in response may be related to the levels of cholinesterase and pseudocholinesterase in the various kinds of animal (Hall, Lehmann & Silk, 1953).

Most of the reports on the use of the relaxant drugs in veterinary anaesthesia have been by workers whose interest was focused on the determination of a dosage rate which would produce muscle relaxation without, at the same time, paralysing the respiratory muscles (Dinsmore, 1950; Jones, 1950; Harris, 1951; Pickett, 1951; Cella & Dozza, 1952; Booth & Rankin, 1953). However, this method of use is unsound and it is now generally agreed that when relaxants are employed they are best given in doses which abolish spontaneous respiratory movements. Completely adequate gaseous exchange can then be assured by the performance of artificial respiration which is under the full control of the anaesthetist.

Suxmethonium has also been used alone, without "anaesthetic cover," to cast horses and cattle (Hansson & Edlund, 1954; Belling and Booth, 1955; Stowe, 1955). This procedure is obviously open to some objection.

Because of the lack of complete reports on the methods of use of relaxants in veterinary anaesthesia, practitioners would be well advised to see the techniques demonstrated by an experienced anaesthetist before attempting to employ these drugs in their surgical practice.

Analgesia

The third of the effects of anaesthesia can be produced by the use of drugs which exert either a local or a general action in the body. General analgesic drugs depress the activity of the whole of the central nervous system, but their principal action is to decrease sensitivity to pain. Local analgesics cause a temporary paralysis of function in nerve fibres or endings and must be applied directly to these nervous tissues.

1. *General Analgesic Drugs in Anaesthesia*

It has been found that when an animal has been made unconscious by the intravenous injection of a barbiturate, the period of narcosis can be prolonged by causing the animal to inhale mixtures of nitrous oxide and oxygen. The inhalation of these mixtures results in a marked degree of analgesia. To obtain the maximum effect the nitrous oxide-oxygen mixture must be administered so that the nitrogen content of the animal's body is displaced and the tissues thoroughly saturated with nitrous oxide. This means that the gas flow rate must be high (in dogs 6 to 8 litres per minute) and rebreathing must not be allowed.

If a still greater degree of analgesia is required it is usual to add low concentrations of trichlorethylene vapour to the gas mixture, or to inject pethidine hydrochloride intravenously (in dogs up to 1 mg. per lb. bodyweight).

2. *Local Analgesia*

In recent years numerous new compounds have been synthetised and examined for local analgesic activity. Few of these, apart from lignocaine hydrochloride, are of much interest in anaesthesia. This compound is more potent than procaine hydrochloride, spreads more easily in the tissues, produces a more rapid onset of analgesia, and does not cause vasodilatation.

It has been demonstrated that the addition of the enzyme hyaluronidase to local analgesic solutions for use in infiltration and nerve blocks in a strength of 2 units per ml. facilitates the spread of the solutions and hastens the onset of analgesia. The spreading of the solutions means that absorption is more rapid and the duration of analgesia is less.

There have been many attempts to prolong the effect of local analgesics, since the duration of action of the commonly used agents does not exceed a few hours, and repeated injections are unwise because of the risk of introducing infection into the area of tissue involved. So far these attempts have not been successful.

Advances in local analgesic techniques include the development of a method for producing segmental epidural block (Magda & Shalduga, 1952; Arthur, 1956). This technique is, however, unlikely to become widely used in veterinary practice since it is difficult to locate the intervertebral space through which the injection must be made. Block of the internal pudendal nerve in cattle (Larson, 1953) for anaesthesia of the penis and relaxation of the retractor penis muscle is extremely useful since it involves no interference with the control of the pelvic limbs.

Also of interest is the use of nerve blocks to produce analgesia *and muscle relaxation* in lightly narcotised ruminant animals—a system of balanced anaesthesia which results in excellent operating conditions while exposing the animal to only the minimum of risk.

Control of Surgical Haemorrhage

Within the last 10 years it has been realised that anaesthetic methods have an influence on the vascularity of the operation site. Excitement during the induction of anaesthesia, anoxia, hypercapnia, respiratory obstruction, resistance to respiration in the anaesthetic apparatus, and the anaesthetic agents used are all factors which can influence the vascularity of an operation wound. By the avoidance of errors in technique, by the selection of the correct anaesthetic agents, and by careful positioning of the patient, it is possible to minimise the bleeding from incised tissues, and for the majority of operations the conditions will then be satisfactory. In certain cases, however, either because of the anatomic site, or the nature, of the operation, haemorrhage may still be so profuse as to hamper the surgeon seriously, and/or to prejudice the success of the operation. On these occasions more active measures may be indicated.

For operations on an extremity of the body a bloodless field can be obtained by the use of an Esmarch's bandage and tourniquet, but for operations on the head, neck, or trunk ischaemia of the operation site can only be obtained by the use of a hypotensive method of anaesthesia.

The hypotensive method which has been employed in veterinary anaesthesia (Hall, 1956) involves the use of drugs which block the transmission of impulses through the ganglia of the autonomic nervous system. The one which has probably been used most in veterinary anaesthesia is a polymethylene-bis-trimethylammonium compound known as "hexamethonium" (C6), the dose for the dog being 1 mg. per lb. of hexamethonium bromide. The animal is anaesthetised and arranged on the operating table so that the operation site is as high as possible above the level of the rest of the body. Hexamethonium is then given by intravenous injection. The object is to obtain an almost bloodless field of operation and not simply to reduce the blood pressure to some pre-determined level. In veterinary practice relaxant drugs should not be used during hypotensive anaesthesia for the rate and character of the animal's respiration are valuable indicators of the degree of cerebral oxygenation and the use of relaxant drugs will complicate the interpretation of any observed respiratory changes.

Hypotensive methods of anaesthesia are contraindicated in hypertensive animals such as greyhounds and, indeed, even in normal animals they are not without risk. They should not be employed unless definitely indicated—*i.e.*, where the proposed operation would be extremely difficult to perform successfully without their aid.

Hypothermia

There is, to-day, a desire to develop methods which will allow surgical operations to be performed within the chambers of the heart. Ideally this requires that the circulation shall be temporarily arrested and the survival of the patient during this period of circulatory stasis presents a problem which still awaits solution. There have been two main lines of approach to the problem. One involves the use of an artificial circulation which is achieved through an extracorporeal heart-lung machine. The second line of approach has been to bring about a depression of cellular metabolism by lowering the body temperature. When cooled, the tissues of the body can withstand prolonged periods of ischaemia, and the circulation can be arrested. The experimental work on body cooling or "hypothermia" has, of course, been carried out on animals, but at the moment there would appear to be no indications for the use of the technique in veterinary surgery.

Shock and Replacement Therapy

The treatment of shock and the replacement of fluid and electrolyte losses in surgical patients are now regarded as being within the sphere of activity of the anaesthetist. The fluid and electroylte requirements of the patient are, of course, usually determined in consultation with the surgeon before the operation begins, but during the progress of the operation only the anaesthetist can recognise the onset of shock and initiate the appropriate treatment.

Clinical research work which was begun during the Second World War has done much to further our knowledge of the shock syndrome (Clarke, 1957). However, changes in the treatment of shock have not been numerous in recent years. While it was formerly recommended that shocked animals should be warmed this is no longer so, and in human medicine some workers have deliberately cooled shocked patients.

In veterinary surgery the treatment of severely injured animals by transfusion of blood, blood plasma or serum, or by the infusion of plasma substitute is apparently becoming widespread. Nevertheless the treatment of shock by transfusion therapy is still largely empirical. It is still impossible to decide on scientific grounds which injured animals require resuscitation if they are to survive.

The use of sodium chloride and glucose solutions to make good sodium and water deficiencies in animals is also still carried out on an empirical basis. While there is no doubt that every effort should be made to replace abnormal losses of these substances there is evidence to suggest that in the immediate post-operative period it is probably safer to rely upon the voluntary intake of fluids by mouth (Le Quesne & Lewis, 1953).

The Use of Antidotes in Anaesthesia

The number of effective antidotes available for use in anaesthesia is still very small. Perhaps this is fortunate for our patients for there is nothing more conducive to use of skill and care in the administration of potent anaesthetic drugs than the knowledge that they have no antidote.

Recently an antidote to the barbiturates has been given clinical trials. This drug is β, β-methylethylglutarimide. It appears to be an innocuous drug with no side-effects, and has the action of decreasing the depth of narcosis due to barbiturate drugs (MacFarlane & Bentley, 1957). Its place in anaesthesia is still uncertain.

N-allyl normorphine has been given extensive trials as an antagonist to morphine and morphine-like drugs. It would appear to be an effective antidote but some dogs which have been aroused from narcosis produced by morphine-like drugs have fallen into a comatose state as soon as the initial stimulant effect of the n-allyl normorphine subsided. It is important to note too that an overdose of n-allyl normorphine causes death from respiratory failure.

The Position of Veterinary Anaesthesia To-day

That anaesthesia is now regarded as being safe for the patient is implied by the fact that it is generally recognised as being the most effective means of restraining an animal. Nevertheless, especially in the larger farm animals, anaesthesia cannot yet provide the surgeon with the best possible operating conditions without at the same time having some adverse effect on the well-being of the patient. With the intelligent use of balanced anaesthetic methods these adverse effects may be small, but they cannot be ignored. Further advances will certainly be necessary before they can be completely eliminated.

References

ARTHUR, G. H. (1956). *Vet. Rec.* **68.** 254-6.
BELLING, T. H., & BOOTH, N. H. (1955). *J. Amer. Vet. Med. Ass.* **126.** 37-42.
BOLTON, J. (1951). *Vet. Rec.* **63.** 523-5.
BOOTH, N. H. & RANKIN, A. D. (1953). *Amer. J. Vet. Res.* **14.** 51-5, 56-9.
BOSWELL, J. G. (1949). Quoted by Wright, J. G. (1952). "Veterinary Anaesthesia." 3rd ed. 168. Baillière, Tindall & Cox, London.
BRODIE, B. B. (1952). *Federation Proc.* **11.** 632-9.
———, MARK, L. C., PAPPER, E. M., LIEF, P. A., BERNSTEIN, E., & ROVENSTINE, E. A. (1950). *J. Pharmacol.* **98.** 85-96.
———, BURN, J. J., LIEF, P. A., & PAPPER, E. M. (1952). Current Researches Anaesthesia and Analgesia. **31.** 145-7.
———, BERNSTEIN, E., & MARK, L. C. (1952). *J. Pharmacol.* **105.** 421-6
———, ———, & ———. (1952a). *J. Clin. Invest.* **105.** 421.
CELLA, F., & DOZZA, G. (1952). *Atti. soc. ital. sci. vet.* **6.** 236-43.
CLARK, A. R. (1957). *Brit. Med. J.* ii. 721-4.
CLOVER, R. H. (1955). *Vet. Rec.* **67.** 354-5.
CRAWSHAW, H. A. (1955). *Ibid.* **67.** 266-8.
CRILE, G. W. (1913). *Lancet.* ii. 7-16.
DINSMORE, J. R. (1950). *N. Amer. Vet.* **31.** 395-6.
DUNDEE, J. W. (1955). *Anaesthesia.* **10.** 139-57.
DUNNE, H. W., & BENBROOK, S. C. (1954). *J. Amer. Vet. Med. Ass.* **124.** 19-20.
DYCE, K. M., JONES, O. G., & WADSWORTH, F. (1952). *Brit. Vet. J.* **108.** 187-91.
EZZEL, A. F. (1947). *N. Amer. Vet.* **28.** 453-5.
FORD, E. J. H. (1951). *Vet. Rec.* **63.** 636-8.
FRANCIS, J., & PARRY, H. B. (1949). *Ibid.* **61.** 509.

(*Concluded on page* 319)

Advances in Anaesthesia.—*Concluded.*

GADD, J. D. (1948). *J. Amer. Vet. Med. Ass.* **112.** 218-20.
GRAY, T. C., & REES, G. J. (1952). *Brit. Med. J.* **2.** 891-2.
HALL, L. W. (1956). "Observations on the Control of Haemorrhage with Special Reference to the Use of Hypotensive Methods." Ph.D. Thesis, University of London.
———. (1957). *Vet. Rec.* **69.** 615-8.
———, LEHMANN, H., & SILK, E. (1953). *Brit. Med. J.* **i.** 134-6.
———, & WEAVER, B. M. Q. (1954). *Vet. Rec.* **66.** 289-93.
HANSSON, C. H., & EDLUND, H. (1954). *Nord. Vet. Med.* **6.** 671-86.
HARRIS, L. E. (1951). *Vet. Med.* **46.** 208-11, 295-300.
HARROW, W. T. (1950). *Vet. Rec.* **62.** 507-9.
HENDERSON, W. M. (1944). *J. Comp. Path.* **54.** 245-7.
JONES, M. L. (1950). *N. Amer. Vet.* **31.** 731-5.
JONES, O. G., SCALES, J. T., & WADSWORTH, F. J. (1952). *Vet Rec.* **64.** 112.
KIRKWOOD, A. K. (1952). *Ibid.* **64.** 338.
LARSON, L. L. (1953). *J. Amer. Vet. Med. Ass.* **123.** 18-27.
LAUBACH, G. D., PLAN, S. Y., & RUDEL, H. W. (1955). *Science.* **122.** 78.
LE QUESNE, L. P., & LEWIS, A. A. G. (1953). *Lancet.* **i.** 153-8.
LIEF, P. A., BURNS, J. J., PAPPER, E. M., & BRODIE, B. B. (1952). Current Researches Anaesthesia and Analgesia. **31.** 147.
LONGLEY, E. O. (1950). *Vet. Rec.* **62.** 17-20.
LUMB, W. V., & ARMISTEAD, W. W. (1952). *N. Amer. Vet.* **33.** 175-6.
MACFARLANE, A. W., & BENTLEY, G. A. (1957). *Vet. Rec.* **69.** 304-6.
MAGDA, I. I., SHALDUGA, N. E., & VOSBOINIKOV, V. M. (1952). *Veterinariya.* **29.** 47-51.
MARCENAC, N., BORDET, R., & LECONSTUMIER. (1952). *Bull. acad. vét. France.* **25.** 227-32.
MARK, L. C., PAPPER, E. M., BRODIE, B. B., & ROVENSTINE, E. A. (1949). *N.Y. St. J. Med.* **49.** 1,546-9.
———, LIEF, P. A., PAPPER, E. M., ROVENSTINE, E. A., BERNSTEIN, E., & BRODIE, B. B. (1949). *Fedcration Proc.* **8.** 318.
———, BERNSTEIN, E., & BRODIE, B. B. (1950). *Ibid.* **9.** 300.
MARTIN, T. D. M., SIMPSON, B., & REID, J. H. (1958). *Vet. Rec.* **70.** 16.
MESSERVY, A., & WYNNE-JONES, E. (1956). *Ibid.* **68.** 32.
MUHRER, M. E. (1950). *J. Amer. Vet. Med. Ass.* **117.** 293-6.
OWEN, L. N., & NEAL, P. A. (1957). *Vet. Rec.* **69.** 413-7.
PALMER, J. R., HAYES, F. A., & DORSEY, N. S. (1954). *N. Amer. Vet.* **35.** 443-6.
PARRY, H. B. (1950). *Vet. Rec.* **62.** 500-5.
———. (1950a). *Ibid.* **62.** 505-7.
———. (1950b). *Ibid.* **62.** 550.
———. (1951). *Ibid.* **63.** 368-9.
———. (1951a). *Ibid.* **63.** 880.
PEREZ Y PEREZ, F. (1952). *Veterinaria.* Madrid. **16.** 711-21.
PICKETT, D. (1951). *J. Am. Vet. Med. Ass.* **119.** 346-53.
RITCHIE, H. E. (1957). *Vet. Rec.* **69.** 895-900.
SCHWEITZER, R. (1954). *Schweiz. Arch, Tierheilk.* **96.** 143-51.
SENEVIRATNE, P., & PILLAI, P. B. K. (1953). *Vet. Rec.* **65.** 537-9.
STOWE, C. M. (1955). *Cornell Vet.* **45.** 193-7.
TITCHEN, D. A., STEEL, J. D., & HAMILTON, F. J. (1949). *Aust. Vet. J.* **25.** 257-61.
TOLLE, A. (1955). *Berl. Münch tierärztl Wschr.* **68** (2). 24-7.
TROUGHTON, S. E., GOULD, G. N., & ANDERSON, J. A. (1955). *Vet. Rec.* **67.** 903-6.
VOUTE, E. J., & HANNEMA, H. A. (1949). *Ibid.* **61.** 654-6.
WADDINGTON, F. G. (1950). *Ibid.* **62.** 101.
WATSON, D. F. (1953). *N. Amer. Vet.* **34.** 334-5.
WEAVER, B. M. Q. (1956). *Vet. Rec.* **68.** 347-9.

A Clinical Trial of the Treatment of Cattle Ringworm

BY

J. D. P. O'BRIEN and K. C. SELLERS

Animal Health Trust, Farm Livestock Research Station, Stock, Essex

SUMMARY.—1. *Four antifungal preparations were compared in a controlled manner in a group of yarded cattle with extensive ringworm lesions on head and neck.*

2. *Following two applications only of the agents at an interval of four days, some regression occurred in treated lesions relative to the controls but this was not maintained.*

3. *Spontaneous healing of treated and untreated lesions occurred* 150 *days after the infection was first noted and* 90 *days after treatments were applied.*

4. *The problem of assessing the value of antifungal agents under farm conditions is discussed.*

Introduction

THE need for adequately controlled trials of antifungal agents in the treatment of ringworm in animals has been stressed by a number of authors (Mortimer, 1955; Sellers, 1956; and Ford, 1956). This communication describes the results of a clinical trial of 4 antifungal preparations in the treatment of extensive ringworm in yarded cattle. The group of cattle consisted of 24 bullocks and heifers of ages varying from 12 to 18 months which had contracted the disease from a group of older animals when running at grass during the late summer. The disease spread rapidly when the animals were brought into yards in October and veterinary advice was sought in early November.

Treatment

Four antifungal preparations were used:—

A. 0.25 per cent. solution of hexadecamethylene-bis (isoquinolium chloride).

B. An alcoholic solution of 10 per cent. iodine and 2 per cent. phenol.

C. 2 per cent. alcoholic solution of dichlorophen.

D. 0.1 per cent. alcoholic solution of phenylmercuric dinaphthylmethane disulphonate.

Allocation of Treatments. A randomised block design was used with treatment differences partly confounded with different sites. The majority of lesions were on the head and neck and 4 zones on each of 24 of the animals, namely the right and left head and right and left neck, were used. Three of the agents were applied in each animal and the fourth zone left untreated. Thus in the group of 24 animals, each of the 4 preparations would be applied to 18 areas and the same 3 treatments would occur in each of 6 animals. This design enabled each treatment to be applied more times than would have been the case if each animal had been treated with a single preparation and permitted a greater number of comparisons in the individual animal; this was of advantage because the variation in the extent of the lesions made comparisons between animals difficult to assess.

The following table summarises the allocation of treatments; as there were no lesions on some zones, these figures refer to the numbers of zones actually treated.

TABLE
ALLOCATION OF TREATMENTS OF ANIMALS

	Right head	Right neck	Left head	Left neck	Total
Untreated ...	7	4	4	5	20
Treatment A ...	5	4	5	4	18
„ B ...	5	5	4	3	17
„ C ...	3	3	4	4	14
„ D ...	4	2	3	5	14
Total ...	24	18	22	21	

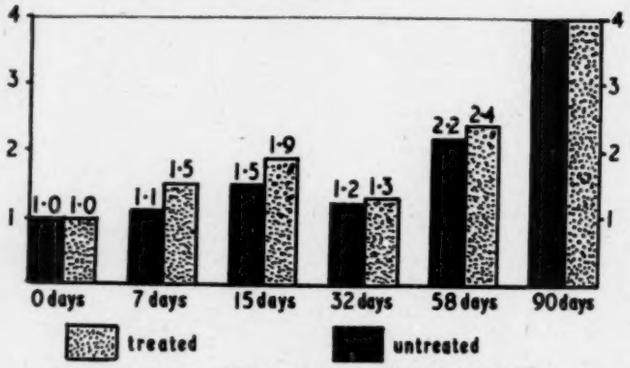
Application of Treatments. Treatments were applied on 2 occasions at an interval of 4 days using a separate stiff brush for each preparation. In most cases the lesion crust became detached and in a few cases bleeding occurred. Four animals were infected in other parts of the body and these lesions were treated with a single preparation chosen haphazardly. Lesions in the untreated zones were left untouched.

Microscopical and Cultural Examinations. Before treatment was commenced, the infection, using a cultural method similar to that described by Austwick (1954), was identified as being due to *Trichophyton verrucosum* Bodin var. *discoides* Ainsworth & Georg. Subsequently caustic potash preparations of crust and hairs from treated and untreated lesions were examined microscopically for the presence of spores.

Results

The results of treatment were assessed on clinical appearance of the lesions examined 7, 15, 32, 58, 90, and 140 days after the second application. After the first application there was no noticeable improvement although treated lesions had retained the stains of the various antifungals used. The first observation made 7 days after the second application showed some regression in all the treated lesions on all zones but there was no observable advantage of any one antifungal over the others. This improvement was still observed at the second examination (15 days) but at 32 and 58 days the treated lesions were indistinguishable from the untreated (control) lesions. A week before the fifth examination the stock manager reported a marked and sudden improvement in lesions on all zones coinciding with an improved bodily condition of the cattle. This was confirmed at the fifth examination (90 days) when the crusts had disappeared from treated and untreated lesions, the skin appeared healthy and new hair was growing. No endothrix spores could be demonstrated microscopically at this stage. At the sixth examination (140 days) no lesions were visible.

During the course of the trial, protocols were kept for each animal and a system of scoring of the improvement of each zone was devised, allocating 1 point for no improvement, 2 points for slight improvement, 3 points for marked improvement, and 4 points for complete healing. It must be admitted that judging one zone against another was difficult but in the following histogram a comparison of the total score of the treated zones is made with the score of the untreated zones. It will be seen that there were slight advantages in the antifungal-treated zones at the first and second inspections but this advantage was not maintained.



COMPARISON OF TREATED AND UNTREATED ZONES.

Discussion

This trial indicated that although improvement occurred following 2 applications of the 4 antifungal agents, this improvement was not maintained. It is possible that further applications may have accelerated the healing process but under normal farm conditions frequent handling of cattle which are yarded, and thus seldom handled, presents difficulties which most farmers are unwilling to overcome.

Sellers, Sinclair, and La Touche (1956) observed that spontaneous healing occurred in naturally and artificially infected calves within 4 months of initial infection. It is of interest to note that spontaneous healing occurred in the present trial after roughly the same period, namely about 150 days after infection was first noted in the group and 90 days after the trial was commenced. Treatment, as applied in this trial, did not advance the date of final recovery. During treatment and the period of observation, the animals were kept in the same yard under the same conditions and on the same food (oat straw, hay, and silage). Recovery occurred in mid-January and was therefore not associated with turning out to grass, seasonal shedding of hair, or increased sunlight, views expressed so frequently in clinical discussion.

This trial, although unsuccessful in its original aim of assessing the value of 4 antifungal preparations, indicates the need for caution in accepting claims based on uncontrolled observation. If, in the absence of suitable controls, an agent were applied during the later stages of infection, it might possibly be concluded that it was a potent antifungal, whereas applied in the early stages it might be considered valueless. This variation in treatment response has been mentioned recently in connexion with older remedies (Fowler, 1957).

In farm trials on cattle ringworm, it is seldom possible to determine the exact stage the lesion has reached and thus difficult to make any valid distinction between the merits of any treatments. We

(*Concluded at the foot of col. 1 opposite*)

Generalised Buffalo-pox

BY

M. Maqsood

College of Animal Husbandry, Lahore, Pakistan

Buffalo-pox is a comparatively benign contagious disease, the lesions of which are mainly localised on the teats and udder ; on rare occasions it appears in a generalised form with eruptions on other parts of the body. In India, Sharma (1934) recorded an outbreak of generalised vaccinia, involving 250 cattle (215 buffaloes and 35 cows) in which the eruptions were mainly present on the teats, udder, medial aspect of the thighs and vulva, and in some cases on the quarters, lips and around the nostrils. Maqsood (1944) recorded 5 cases of generalised pox in milch buffaloes, the lesions of which were seen all over the body. Since 1944, the author has observed a number of cases of generalised buffalo-pox in different parts of the Punjab region, West Pakistan, and in this note a general description is given.

FIG 1.—Buffalo No. 1 showing pox lesions on the udder, vulva and medial aspects of the thighs.

FIG. 2.—Buffalo No. 1 showing pox lesions on other parts of the body.

FIG. 3.—Buffalo No. 2. Closer view of the fore-leg, showing pox lesions.

Clinical Symptoms

In the immediate pre-eruptive stage the affected animal appears dull, there is loss of appetite and a rise of temperature varying from 101° to 104° F. The conjunctivae are congested and there is watery discharge from the eyes. The pox lesions appear on the teats and udder and ultimately all over the body. In some cases they are restricted to the thighs and vulva while in others they are more or less generalised (Figs. 1 to 3), but they all pass through the typical stages of pox lesions. In uncomplicated cases the affected animals recover within 3 to 4 weeks. In some cases secondary complications have been observed including mastitis,

(*Concluded at the foot of col. 1 overleaf*)

A Clinical Trial.—*Concluded.*

have concluded that the most satisfactory way of assessing antifungal agents in clinical treatment is by the use of artificially infected animals where the exact time of infection and appearance of the lesion is recorded and where clinical observation can be supported closely by cultural and histological procedures.

Acknowledgments.—We are grateful to Mr. G. C. Ashton, B.Sc., of this laboratory for his advice in designing the trial, and to the Co-partnership Farms Ltd., Essex, for allowing us facilities for its execution.

References

AUSTWICK, P. K. C. (1954). *Vet. Rec.* **66.** 224.
FORD, E. J. H. (1956). *Ibid.* **68.** 803.
FOWLER, N. G. (1957). *Ibid.* Correspondence. **69.** 573.
MORTIMER, P. H. (1955). *Ibid.* **67.** 670.
SELLERS, K. C., SINCLAIR, W. B. V., & LA TOUCHE, C. J. (1956). *Ibid.* **68.** 702.
———. (1956). *Analyst.* **81.** 77.

Association for the Advancement of Virus Pneumonia-free Pigs

AN Association having the above title was formed at a meeting attended by over a hundred people, held at Agriculture House on April 1st. The meeting had been called by the promoters of the Association in the names of Professor W. I. B. Beveridge (Cambridge), Mr. M. J. Parker (Bradwell-on-Sea, Essex), and Mr. Norman Snell (Kingham Hill Trust Farms, Kingham, Oxford). The aims of the Association are summarised as follows:—

(a) To spread knowledge regarding this disease and to lay down minimum standards for herds claiming freedom from the disease.

(b) To issue lists of members of the Association indicating those who claim freedom from V.P.P. and those who have breeding stock for sale. Also to issue a news letter once or twice a year on any points of interest concerning V.P.P.

(c) To publicise the existence of the Association and its aims.

(d) To promote facilities for the examination of lungs.

(e) To provide opportunities for meeting and discussion for those interested in the establishment and maintenance of V.P.P.-free herds.

Standards for herds claiming freedom from V.P.P. had already been drawn up and were approved. These standards were:—

1. All pig herds are suspect for V.P.P. unless (a) the herd has passed the tests set out in the following paragraphs over a period of at least eighteen months; (b) the herd has been founded entirely by the introduction of pigs from other herds whose freedom from V.P.P. is established according to the rules of the Association. Regular inspection of lungs as set out in the following paragraphs, demonstrates continuing freedom from V.P.P.

2. *Herds where at least one third of each litter pass through fattening houses.* The lungs of at least 30 pigs, or of at least 50 per cent. of the quarterly throughput of the fattening house (whichever is the lower), must be examined every 3 months by a veterinary surgeon and found clear of lesions typical of V.P.P. and 95 per cent. of them clear of any pneumonia lesions in the anterior lobes. If more than 5 per cent. of the lungs have pneumonia of the anterior lobes, they must be examined microscopically and the pneumonia found to be other than V.P.P.

3. *Herds in which the majority of pigs do not pass through a fattening house.* (a) Weaners must be mixed in groups each comprising at least 3 litters. From each of such groups the lungs of at least 30 per cent. must be inspected at slaughter. (b) Alternatively the lungs of at least 50 per cent. of each litter must be examined at slaughter. In either case 100 per cent. of lungs examined must be free from lesions of the anterior lobes microscopically resembling V.P.P.

4. *Veterinary Inspection of Herd.* Every six months an inspection must be carried out by a veterinarian. This shall include inspection of records of lung examinations, a general inspection of all pigs and the premises, and an enquiry about movements of pigs on and off the premises and precautions taken to ensure isolation. Any coughing observed should be investigated and if thought necessary followed up by *post-mortem* examination. Any relevant information such as the health of pigs sold to other farms should be considered. The veterinarian should issue a certificate to the effect that, in his opinion, the requirements laid down by the Association have been followed and he knows of no reason why the herd should not be classified as free from virus pneumonia.

5. The herd must be kept closed, except for the addition of pigs from other herds complying with these requirements. This means that no pigs sent to a show or sale may return to the farm, and pigs which have strayed away may not be accepted back into the herd. Every precaution must be taken against other stray pigs visiting the premises. No visiting sow or boar is allowed on the farm. Other pigs may not be brought on to the premises in a haulier's lorry, unless adequate precautions are taken to ensure that such pigs do not come within 20 yards of pigs in the herd.

6. After a herd has fulfilled the above requirements for a total period of 3 years the number of

---

Generalised Buffalo-pox.—*Concluded.*

stenosis of the milk ducts, and the formation of indolent ulcers on the teats and other parts of the animal. Clinically there is a close resemblance between buffalo-pox and cow-pox but a perusal of the available literature shows that so far no systematic work has been carried out to confirm the exact identity of the virus. Cases of generalised buffalo-pox are often associated with outbreaks of smallpox.*

References

MAQSOOD, M. (1944). *Ind. J. Vet. Sci., and Anim. Husb.* **14**, 213.

SHARMA, G. K. (1934). "Selected Clinical Articles." *Misc. Bull.* No. 8. ICAR, New Delhi.

* F. C. Minett, in the 1949 edition of the "Government of Pakistan Outline of Veterinary Science" (page 63), writes: "In Indo-Pakistan outbreaks of buffalo-pox have been reported from several localities, e.g. Punjab, and have been associated with outbreaks of small-pox. The disease is of mild type and is easily diagnosed by the characteristic skin eruptions. These may be localised on the udder and teats and inside the thighs, or they may be present in generalised form on the skin of other parts of the body. The symptoms in general are not serious, but there is a fall in milk yield and the animals appear unthrifty. Treatment is as for cow-pox, but particular attention should be paid to prevention of myiasis as buffaloes are attractive to flies."

lungs examined and frequency of veterinary inspections may be reduced by half.

In the absence of Mr. W. T. Price who was indisposed, the chair was taken by Mr. Norman Snell who introduced the provisional committee, listed below, which was later elected *en bloc* for a period of a year. The committee is as follows:—

Mr. N. Snell, Kingham Hill Trust Farms, Kingham, Oxon (Chairman); Mr. M. J. Parker, Bradwell-on-Sea, Essex; Professor W. I. B. Beveridge, 269, Milton Road, Cambridge; Mr. J. E. R. Parsons, Innfield Gardens, Glatton, Huntingdon; Mr. Stephen Horvat, Worlingworth, Woodbridge, Suffolk; Mr. F. V. Harvey, St. James, Halesworth, Suffolk; Mr. G. Johnson, Ross-on-Wye, Herefordshire; Mr. R. Lyles, Helhoughton, Fakenham, Norfolk.

Dr. P. Whittlestone of the Department of Animal Pathology, University of Cambridge, addressed the meeting on the subject of V.P.P.

The chairman was careful to point out that it had been found quite impracticable for the Association to accept any responsibility for claims made by members that their herds were free from virus pneumonia. The object of the Association was to draw up minimum standards as a guide for herds pursuing a policy of freedom from V.P.P. and as a guide to would-be purchasers of pigs, in assessing claims for freedom from the disease. Some care and attention had gone into the drawing up of the minimum standards, but it was suggested that these might be revised at future general meetings of the Association in the light of future experience. Clearly everything depended upon the accurate diagnosis of V.P.P. in the lungs, and here the close co-operation of veterinary surgeons would be essential. Opinion was expressed that a standard certificate be drawn up for the use of veterinary surgeons to sign for herds accepting the Association's standards, and it was unanimously agreed that the British Veterinary Association be consulted and be asked to assist in the drawing up of such a certificate. Copies of such certificates would be in duplicate, one being retained by the farmer and one being sent to the secretary of the Association.

Questions were raised regarding the examination of lungs, and here the Association hopes to promote facilities for examination of lungs at bacon factories, but all examinations must be made by members of the veterinary profession. It was thought it would be essential for a central laboratory to be set up where doubtful lungs, or doubtful pieces of lungs in saline solution, could be sent for further examination. The laboratories of the Animal Health Trust were mentioned in this respect and it is hoped that satisfactory arrangements will be able to be made.

Mr. W. T. Price, Principal of Harper Adams College, had sent a message to the meeting, saying that in his view, as a long-term policy, the eradication of V.P.P. was of a similar order of importance as bovine tuberculosis, and as a short-term policy was several times more important economically than the recent cut in the government support price for pigs.

First Annual Congress of the B.S.A.V.A.

We are indebted to Mr. G. N. Henderson, B.SC., M.R.C.V.S., *for the following account of the first annual congress of this newly formed Association.*

TO the organisers of this congress which took place at the Shaftesbury Hotel, London, W.C.2, on March 28th, 29th, and 30th, probably the most surprising, though impressive, feature was its overwhelming success. Never, even in their most optimistic moments, could they have anticipated the exceptional way in which the profession rose to support this innovation of a week-end entirely devoted to the scientific and professional problems of practitioners in small-animal practice.

It is perhaps impossible to single out any particular reason for this success. Some members may have been primarily interested in the discussions on such problems as "professional fees" or the welfare clinics. Others may have been attracted by the scientific papers which covered a wide range of subjects from new diagnostic methods, eye conditions, and recent advances in small-animal surgery, to the uses of cortisone and the ailments of cage- and aviary-birds. Perhaps the answer lies in the variety of interests covered, though many subjects planned for inclusion had to be dropped owing to the shortage of time.

The President, Mr. C. E. Woodrow, referred to these subjects in his opening address. He mentioned, for example, the significant drop in the number of dog licences issued in the London and Middlesex County Council areas due to the restriction on dogs and cats now placed on council tenants. This regrettable trend, he said, had been partly responsible for a change in the ratio of patients of different species. Budgerigars, which these Councils permitted, had increased in numbers over the country from 600,000 to 6,000,000 in the last 10 years. He also drew attention to an important omission from the list of subjects for discussion, namely "Distemper and Hard Pad." He felt that this was due to the noticeable drop in the number of cases now seen. This was probably a direct result of the increase in vaccination, since where pockets of infection were seen they were often in poor-class urban areas where vaccination was not practised. He counselled members, however, to note the recent campaign for vaccination against leptospirosis, which, apart from its importance in dog patients, had an equally important public health significance.

In welcoming the 245 veterinarians attending the congress Mr. Woodrow made special reference to the visitors from overseas; they included Dr. Archibald from Ontario who gave a most stimulating paper on prostatectomy, Dr. Moltzen from Denmark, four veterinarians from Holland, Dr. Alloy from France, and Dr. Peters also from Holland who represented the small-animal associations in their countries.

Apart from the scientific and professional papers there was a modest, but nevertheless successful, social programme including a very well organised dinner dance at the Trocadero restaurant. One possible

regret was the low number of members' wives attending, which restricted the plans made for them to visit the warehouse and fur store of the Hudson Bay Company.

The trade display was thought by many veteran congress exhibitors to have been the most successful they had known. Attendance was excellent, probably due to the careful planning of the Exhibition Committee who from the first insisted that this feature was to be regarded as an integral part of the congress. In addition, a small scientific stand was stocked with equipment and instruments bearing on the surgical papers presented.

On the final day the annual general meeting took place when Mr. Woodrow was re-elected President and Mr. Hodgman was elected President-elect. Mr. Brian Singleton, who bore the main burden of organisation of the congress, was re-elected secretary, and the president presented him with a silver dish as a token of appreciation for all the long hours he had put in to make the event the success it was. Among the resolutions passed at this meeting a very large majority voted in favour of the Association seeking recognition as a Division of the B.V.A.

There was a unanimous vote in favour of a list of suggested minimum fees being prepared and circulated to members, and several resolutions aimed at providing maximum support to the B.V.A. and R.C.V.S. in regard to negotiations with the animal welfare societies were passed unanimously.

From this congress the profession may well take pride in its contribution to the care and welfare of small-animal patients. The B.S.A.V.A. appears to have tapped a body of opinion in the profession both vigorous, vocal, and progressive, who have previously found it difficult, due to the limitations of free time in single-handed small-animal practice, to contribute to the strength of our corporate body. This body of opinion reflects the progress of our professional status in the last two decades and makes it clear that the high standard of knowledge in large-animal practice in this country is certainly equalled by the perhaps less obvious daily work of the small-animal veterinarian concientiously working, often alone, in furthering knowledge of veterinary science all over the world.

Current Literature

BOOK REVIEWS

Breeding Problems and Artificial Insemination. S. W. J. VAN RENSBURG. Libagric. P.O. Box 15, Pretoria, 1957. 28s. 6d.

This publication is intended primarily for stock-owners and others engaged in artificial insemination work, although the needs of students and even those who devote their time to the investigation of animal infertility problems have not been forgotten.

Many points are introduced in a way which makes it abundantly clear to the reader that the author has knowledge of his subject born of long practical experience.

The contention that genital vibriosis can be transmitted other than at coitus will create a great deal of interest, as will the assertion that the condition known as granular vaginitis is actually a disease. Furthermore, clinicians in the United Kingdom who remember outbreaks of vesicular vaginitis in cattle are hardly likely to agree that this particular infection, in spite of the spectacular symptoms, usually prevented the cow from conceiving.

Certainly, as far as the stockowner and lay inseminator are concerned, this book achieves its object, each subject being dealt with in an easily understandable and interesting manner. It will also appeal to those who want more detailed information, particularly since it is brought right up to date, including references to blood-grouping, ovum transplantation and a recent report describing a method of preserving semen at room temperature.

The author has shown a positive approach towards the influence of nutrition on reproductive efficiency, something which has been sadly lacking in previous text-books dealing with this subject.

Microphotography. Photography at Extreme Resolution. G. W. W. STEVENS, PH.D., F.R.P.S. Pp. xvi + 326. Chapman & Hall, London. 50s.

Microphotography is the reduction to minute photographic images of objects photographed, photomicrography the production of magnified images of minute objects. This statement of antithesis is necessary in view of the confusing carelessness with which the words are used and it also defines the scope of this book.

In a way, snapshots of people and photographs of scenery are microphotographs, but the microfilming of books and documents and the manufacture of graticules, such as those used in stage and eyepiece micrometers, call for mechanical precision and resolution of detail far beyond those required in domestic photography. Dr. Stevens's exposition of the subject is essentially simple. His first chapter is introductory and includes a short historical note ; the second provides a practical introduction to basic technique. The next 8 chapters deal in some detail with practical and theoretical aspects of the subject : the sensitive material—a lucid account of high resolution recording media—processing the latent photographic image, camera objectives, critical focusing, the optical bench, subject illumination, technique in general and anomalous image formation. Chapter 11 deals briefly with the production of graticules—as the author observes, that subject alone could be expanded to fill a book. Chapter 12 concerns practical aspects of document photography. The research applications discussed in Chapter 13 include testing the resolution of lenses and emulsions, autoradiography and the recording of nuclear transformations.

This synopsis of the ground plan of the book gives no idea of the author's erudition and his meticulous attention to detail. His is a brilliant and authoritative account of the subject, all the more remarkable because it is the first. Obviously it is not a book for the general veterinary reader. But anyone with only an amateur's knowledge and experience of general photography will be fascinated by these, for him, new vistas, the laboratory worker will derive much new technical information of value in his work and even the general reader will be intrigued by the uses of microphotography in espionage. As one would expect of such a book, the illustrations are of the highest quality and the typography and binding, too, make it a pleasure to handle. An appendix lists processing formulae and discusses lens calculations and series of exposure times and author references are given in detail at the end of each chapter to facilitate further study.

REPORT

British Empire Cancer Campaign. Thirty-fourth Annual Report covering the year 1956. Registered offices: 11, Grosvenor Crescent, Hyde Park Corner, London, S.W.1.

It is at once apparent that the research work being carried out with the support of the B.E.C.C. is of such a varied nature that it is not possible to refer to more than a few of the lines of work now being so vigorously and ably pursued. The reviewer can only mention more or less at random some of the most interesting investigations referred to in this Report.

Taking the reports as they come, the experiment to determine the effect of maintaining fowls in a standardised environment (that is, one with the temperature of 65° F., a relative humidity of 60 per cent., and artificial light only) was in its fifth year: 84 per cent. of the group of chickens so kept have died of adenocarcinomas; no deaths have occurred in the control sibs kept in a more normal way (p. 1). It was previously reported that when the ES4 virus of erythroleukaemia was injected into young chickens, papillary adenocarcinomas of the kidney were induced. It is now reported that a better yield of tumours was obtained if the virus was injected directly into the kidney (p. 1). Interstitial cell tumours of the testes of young chickens have been induced by the viruses of a reticuloendothelioma (MH2) and the ES4 avian myxosarcoma (p. 2). Further evidence has been collected which supports the view that neurolymphomatosis and the avian leukoses are unrelated conditions (p. 3).

There are a number of reports concerned with experimental work on the relationship between smoking and lung cancer. For example, mice painted with tar from English cigarettes had not developed skin tumours after one year, but 2 animals painted with tar from American cigarettes had papillomas after a similar interval (p. 15).

It is stated that bladder cancer can be caused by endogenous chemical carcinogens produced in the metabolism of tryptophane (pp. 35, 39). The induction in hamsters

of melanomas is reported at sites remote from painting with dimethylbenzanthracene alone, but not in hamsters similarly painted but also given a stilboestrol implant. Such melanomas resemble the blue naevi of man, and macroscopically resemble some of the spontaneous skin melanomas of dogs (p. 49).

Studies of xanthine oxidase in mouse mammary tumours showed a deficiency state in the tumour, which to a larger degree was also present in the mammary tissues prone to develop a malignant tumour (p. 53). Studies on tumour immunity include an antigenic study of the plasma of cancerous rats (p. 54), an analysis of liver and hepatoma antigens (p. 57) and a study of the antigenic composition of normal and tumour cells (p. 58).

The hypothesis that recurring cell division is a rhythm generated by a feed-back cycle was supported by the results of microsurgical interference with the cell of *Amoeba proteus* (p. 60). Long-term clinical studies of the results of radiotherapy of cancer of the bronchus, pharynx, breast, thyroid, brain, bladder, and testis are in progress (p. 74).

A sarcoma has been induced in two fowls by injection with colloidal benzpyrene (p. 147). Studies of chloroform-induced renal necrosis in mice showed that mice of both sexes under 10 days of age are insusceptible, even when large doses of androgen have been given; after about 10 days of age, the mice were susceptible if given androgen, whilst the natural susceptibility of males coincided with sexual maturity (p. 187).

Of 28 children with neuroblastoma treated with vitamin B_{12}, 13 have died without showing any significant response, while the other 15 all showed evidence of tumour arrest or regression (p. 213). Electron microscope studies of certain chicken tumours (2 virus induced, 2 chemically induced) have shown morphological differences, but so far no virus-like particles have been identified (p. 281). One placenta of a foetal calf aged 30 to 32 weeks, and pooled placentas of foetal lambs from ewes 84 to 166 days pregnant, have been tested for mammotrophin by the pigeon-crop method, with negative results (p. 286).

A report on the B.E.C.C. Conference on "oestrogen methodology" (pp. 340 to 349) concludes: "In the opinion of the Conference it is important to stress that any satisfactory quantitative oestrogen methods must necessarily be very complex and technically difficult, and that therefore they should not be lightly undertaken with inadequate facilities. The two currently used methods [of Brown and of Bauld], which were critically examined at the Conference, are not ones which are suitable for use in a hospital routine laboratory; they were designed for use in specially equipped and staffed laboratories, and the precision and accuracy of which they were capable can only be obtained under these conditions. The Conference also wishes to put on record its opinion that the publication of results obtained by any method for the determination of urinary oestrogens by workers who have not themselves determined the precision and accuracy of that method is to be deplored."

Further studies have been made of tissue homotransplantation in cattle (p. 483). Two different sarcomas have been induced in rats by subcutaneous injections of two different commercial tannin extracts (p. 502).

These are brief references only, which leave out of account many valuable reports on biochemical, radiological, enzymatic, biological, and other studies, but they show that there is clearly much of great interest and value in this Report.

However, while the matter of the Report is of the greatest interest to workers in the field of cancer research, the manner of the presentation of the material leaves very much to be desired. It seems incredible, for example, that there should be no index to the subjects dealt with—there are lists of research workers mentioned, covering 10 pages, but without a detailed subject index, the Report must remain almost unusable. It does not seem to have been clearly decided just to whom this Report is addressed—whether to those who have subscribed to the B.E.C.C., or to research workers here and in other countries. At the beginning of the present Report is a "Summary" which can hardly be expected to be readily understood by the enquiring layman, and then follow, arranged in a somewhat arbitrary fashion, chiefly according to their place of work but also partly according to their initials, accounts of varying brevity from the different research workers.

It seems to the reviewer that what is wanted is firstly a broad survey of the way cancer research supported by B.E.C.C. is going, without giving details but highlighting what appear to be significant findings and trends—a summary which the layman can grasp. Then should follow, arranged according to subject, concise but adequately detailed reports of the individual worker's findings, so presented that other research workers have all the basic information they need. It should be made clear just which part of the work recorded has been or will be published in full, and what will otherwise be unavailable. Above all, it needs a subject index: this would delay the appearance of the Report but would make it a far more useful one than it is at present.

News and Comment

INTERNATIONAL CONGRESS ON ABATTOIRS

Under the auspices of the Syndicat Nationale des Veterinaires an international congress is being organised to study the subject of modernisation of abattoirs. It will be held in Metz on May 17th and 18th. Delegates will attend from a number of European countries, and the organisers express the hope that British veterinary surgeons will be present. Immediately after the Congress a study tour of abattoirs in the Ruhr area has been arranged from May 19th to 23rd.

Members of the profession who intend to be present at the Congress and/or the study tour, are asked to write immediately to Dr. Paul Chevalièr, Veterinaire, Directeur des Abattoirs, 5, bis, Ile Chambèire, Metz, France.

ASSOCIATION OF VETERINARY TEACHERS AND RESEARCH WORKERS

Scottish Regional Group

The Annual General Meeting of the Scottish Regional Group will be held on Saturday, May 10th, 1958, at 10.45 a.m. at the University Veterinary Hospital, Bearsden Road, Bearsden, Glasgow. The meeting will take the form of a Symposium on Immunology.

Programme

10 to 11 a.m., Coffee available; 10.45 a.m., Business meeting followed by the Symposium.

PERSONAL

The Agricultural Research Council, after consultation with the Association of British Pharmaceutical Industry, have appointed **Mr. N. M. Black,** M.R.C.V.S. (Veterinary Adviser to Boots Pure Drug Co. Ltd.), to be a member of the Veterinary Therapeutic Testing Board in succession to Mr. N. C. Collins, M.P.S.

Birth

FRASER.—On March 14th, 1958, to Eleanor, wife of Donald Fraser, B.SC., M.R.C.V.S., of 27, Nelson Street, Huntly, Aberdeenshire, a daughter.

Marriages

ELLIS—COLEMAN.—At St. Mary's Church, Reading, on March 22nd, 1958, Francis B. Ellis, PH.D., B.SC., only son of Mr. and Mrs. J. B. Ellis, Greenbanks, Giggleswick, Settle, Yorks, to Irene N. L. Coleman, daughter of Mr. and Mrs. J. R. R. Coleman, 50, Friar Street, Reading.

MILLER—BRAMMAH.—On Friday, March 28th, 1958, at St. Peter's Church, Formby, Lancashire, by the Rev. W. J. Thomas, Peter Gordon Miller, M.R.C.V.S., to Pauline Brammah, S.R.N.

FOOT-AND-MOUTH DISEASE

Foot-and-mouth disease was confirmed on April 7th among cattle at Whalley, Lancashire.

An area extending for approximately 10 miles around the infected premises has been declared to be an Infected Area.

Animals may not be moved in the Area without a licence and the holding of markets in the Area is restricted.

COMING EVENTS

April

16th (Wed.). Combined Meeting of the Royal Society of Medicine, Section of Comparative Medicine, and the Section of Pathology at the Society's House, 5 p.m.

Spring Meeting of the North of Scotland Division in the Marcliffe Hotel, Aberdeen, 2.30 p.m.

Meeting of the Southern Counties Veterinary Society at the Hampshire Cattle Breeders' Society, Lyndhurst, 3.30 p.m.

17th (Thurs.). All-day Meeting of the Central Veterinary Society at the Royal Veterinary College, Camden Town, 11 a.m.

General Meeting of the Herts and Beds Veterinary Society at 70, Holywell Hill, St. Albans, 7.30 p.m.

23rd (Wed.). Meeting of the Lincolnshire and District Division at the Campbell Hotel, Peterborough, 2.30 p.m.

25th (Fri.). General Meeting of the Mid-West Veterinary Association at the Berkeley Café, Clifton, Bristol, 2.30 p.m.

General Meeting of the Yorkshire Veterinary Society in York, commencing in the Attested Ring at York Market, 2.30 p.m., and continuing in the City Arms Hotel, Fawcett Street.

26th (Sat.). Annual General Meeting of the Association of State Veterinary Officers in the auditorium of the Wellcome Research Institute, 183-193, Euston Road, London, N.W.1, 4 p.m., followed by the Annual Dinner at the Café Royal, 6.30 p.m.

May

1st (Thurs.). Annual General Meeting of the Central Veterinary Society.

9th (Fri.). Meeting of the R.A.V.C. Division at the R.A.V.C. School and Stores, Thornhill, Aldershot, 12 noon.

10th (Sat.). Annual Dinner-Dance of the Chiron Club at the Royal Hotel, Bristol, 6.30 p.m.

Annual General Meeting of the Scottish Regional Group of the A.V.T. & R.W.'s at the University of Glasgow Veterinary Hospital, Bearsden Road, Bearsden, Glasgow, 10.45 a.m.

10th and 11th (Sat. and Sun.). 6th Annual Reunion of the R.V.C. '52 Club at Ye Miller of Mansfield, Goring-on-Thames.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Cumberland. Brackenthwaite Farm, Heads Nook, Carlisle (Mar. 31).

Dorset. Home Farm, Stalbridge, Sturminster (Mar. 31).

Salop. Park Farm, Ruyton XI Towns, Shrewsbury (Mar. 31).

Foot-and-mouth Disease

Norfolk. Low Farm, Aldeby (Mar. 31); Old Hall Farm, Trowse, Norwich (Apr. 1).

Suffolk. Valley Farm, Melton Woodbridge (Apr. 2).

Fowl Pest

Herts. 19, Garden Walk, Royston; Willowside Poultry Farm, Royston (Apr. 1).

Swine Fever

Anglesey. Plas Coch Farm, Llanedwen, Brynseincyn (Mar. 31); Trefor Newydd, Pentraeth (Apr. 1).

Bucks. Spring Grove Farm, Mursley, Bletchley (Mar. 31).

Derbys. Greenside Poultry Farm, Alstonefield, Ashbourne (Mar. 31).

Dorset. Childhay Manor Farm, Broadwindsor, Beaminster (Mar. 31).

Herts. Lantern Lane Piggeries, Aston End, Stevenage (Apr. 1).

Lancs. Coppice Farm, Copy Lane, Netherton, Liverpool (Mar. 31).

Leics. The Biggen, Sharnford (Apr. 2).

Middx. 570, Hanworth Road, Hounslow (Mar. 31).

Norfolk. French Church Farm, Caistor St. Edmund, Norwich (Apr. 2).

Northants. Shortlands, Helmdon, Brackley (Mar. 31).

Sussex. Sunbury Farm, Willingdon Drove, Eastbourne; Half Acre Holding, West Wittering, Chichester (Mar. 31).

Warwicks. Watton Farm, Water Orton (Mar. 31); 102, Colebrook Road, Shirley, Solihull; Plank Lane, Water Orton, Birmingham (Apr. 2).

Worcs. Bevere Green Farm, Claines (Mar. 31).

Yorks. West Marton Piggeries, West Marton, Skipton; Moorside Dairies, Moorside Road, Eccleshill, Bradford (Mar. 31).

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Vibriosis in Bulls

Sir,—A letter on the above subject was published in THE VETERINARY RECORD on February 12th, and in a reply on March 8th the contributors felt that I had misunderstood the purpose of their writings in your journal on vibriosis in bulls over the past months.

Comments made and questions asked in mine of February 12th sought to clarify a situation vital to the commercial A.I. industry, and it was hoped that from the various studies of A.I. bull studs recorded this information could have been given.

Points worthy of comment in respect of the reply printed in your issue of March 8th are:—

1. It was hoped that for the first time under commercial A.I. conditions information on fertility levels and abortion rates would have been available so that informed opinions would have more factual material made available to them.

2. It is unfortunate that only one bull could be selected for pre- and post-treatment conception rate studies, especially as we know how normal bull C.Rs. fluctuate under A.I. conditions, irrespective of the bacteriological status of the reproductive tract.

A Table was shown giving conception rates of maiden heifers served with semen from 7 non-infected bulls and 2 infected ones. It would be desirable to examine this Table in greater detail before reaching final opinions as to its significance.

3. The addition of antibiotics to diluted semen has for many years been common practice in commercial A.I. However, there has always been a conflict of views between American and British workers as to the protection afforded by such additions. In the States the industry is unanimous as to the protection given, but in this country views are quite different, so conflicting in fact that in parts (2) and (3) of the letter (March 8th) the same conflict of views is presented. In the one case it is suggested that the addition of antibiotics is important in preventing the spread of *Vibrio fetus*, while in paragraph (3) it is shown that little protection can be expected under experimental conditions.

4. The authors take for granted that infected bulls show improved conception rates when antibiotics are added to the semen. Likewise, they also draw attention to the fact that when A.I. "infected" females are served naturally there are dangers of breeding problems being created. As I stated in my opening paragraph, the answers to such questions as these are indeed vital to the whole well-being of the A.I. industry, and it was hoped that the information could have been obtained indirectly from the bull studs involved in the bacteriological studies.

5. Since satisfactory conception rates remain a constant feature of the A.I. organisation in this country, it appears that health tests now applied are adequate. Therefore, with many questions remaining unanswered, it would, in my opinion, be unwise to adopt additional tests which could give inconclusive findings.

Yours faithfully,
G. F. SMITH,
Chief Veterinary Officer.

Milk Marketing Board,
Thames Ditton,
Surrey.

March 28th, 1958.

ADVERTISERS' ANNOUNCEMENTS

EVANS MEDICAL SUPPLIES LIMITED announce the availability of DERMEVAN—a new topical biocidal agent for the treatment of foot-rot in sheep and ringworm in cattle. Dermevan lotion is presented in bottles of 500 c.c. and is claimed to possess the well-known, instantaneous bactericidal, fungicidal, and antiviral activities of iodine in a new, solubilising medium which ensures greatly reduced irritation and no staining.

BURROUGHS WELLCOME & CO. announce that the "Wellcome" brand Flutter Valve Injection Apparatus is now issued without a teat siphon and hypodermic needle.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th March, 1958		6	—	6	7	—	43
Corresponding period in	1957	30	—	2	41	—	42
	1956	183	1	4	23	—	19
	1955	41	—	1	8	—	48
1st January to 15th March, 1958		37	1	97	173	—	212
Corresponding period in	1957	102	2	13	232	—	181
	1956	683	3	8	148	—	122
	1955	225	—	6	148	—	241